

The Walk on Floor Eyes Closed Tandem Step Test as a Quantitative Measure of Ataxia after Space Flight

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INTRODUCTION

Posture and locomotion are among the functions most affected by space flight. Postflight ataxia can be quantified easily by using the walk on the floor line test with the eyes closed (WOFEC). Data from a modified WOFEC were obtained as part of an ongoing interdisciplinary pre- and postflight study (Functional Task Test, FTT) designed to evaluate both postflight functional performance of astronauts and related physiological changes.

METHODS

Five astronauts with flight durations of 12 to 16 days participated in this study. Performance measurements were obtained in 2 preflight sessions, on landing day, and 1, 6, and 30 days after landing. The WOFEC test consisted of walking with the feet placed heel to toe in tandem, arms folded across the chest and eyes closed, for 10 steps. A trial was initiated after the eyes were closed and the front foot was aligned with the rear foot. The performance metric was the average percentage of correct steps completed over 3 trials. A step was not counted as correct if the crewmember sidestepped, opened eyes, or paused for more than 3 seconds between steps. Step accuracy was scored independently by 3 examiners.

RESULTS

Immediately after landing subjects seemed to be unaware of their foot position relative to their body or the floor. The percentage of correct steps was significantly decreased on landing day. Partial recovery was observed the next day, and full recovery to baseline on the sixth day post landing.

CONCLUSION

These data clearly demonstrate the sensorimotor challenges facing crewmembers after they return from space flight. Although this simple test is intended to complement the FTT battery of tests, it has some stand-alone value as it provides investigators with a means to quantify vestibular ataxia as well as provide instant feedback on postural stability without the use of complex test equipment.